

- 14 -

We claim:

1. A process for preparing lactones by catalytic carbonylation of oxiranes using a catalyst system comprising

- a) at least one carbonylation catalyst A comprising uncharged or anionic transition metal complexes of metals of groups 5 to 11 of the Periodic Table of the Elements,
- b) at least one metal compound B of the formula (I)



where

- M is an element of group 2, 3, 4, 12, 13,
 R is hydrogen or a hydrocarbon radical which may be substituted on the carbon atoms other than on the carbon atom bound to M,
 X is an anion,
 n is a number corresponding to the valence of M,
 x is in the range from 0 to n, and

- c) at least one organic, chiral compound C which has fewer than four coordination sites.

2. A process as claimed in claim 1, wherein enantiomerically enriched lactones are obtained in the process.

3. A process as claimed in claim 1 or 2, wherein the component A is selected so that a cobalt carbonyl compound is present under the reaction conditions.

4. A process as claimed in any of claims 1 to 3, wherein M in the formula (I) is Al, Mg, Zn, Ti, Zr or Sn.

5. A process as claimed in any of claims 1 to 4, wherein, in the formula (I), R is hydrogen or C₁₋₃₂-alkyl, C₂₋₂₀-alkenyl, C₃₋₂₀-cycloalkyl, C₆₋₁₈-aryl, C₇₋₂₀-aralkyl or C₇₋₂₀-alkaryl, where substituents may be present on the carbon atoms other than the carbon atom bound to M,

- 15 -

and/or X is Cl, Br, I, sulfonate, oxide, C₁₋₃₂-alkoxide or amide.

- 5 6. A process as claimed in any of claims 1 to 5, wherein the component B is AlCl_xR_{3-x},
where x is from 0 to 3 and R is C₁₋₆-alkyl.
7. A process as claimed in any of claims 1 to 6, wherein the component C is a
bisoxazoline compound and/or comprises at least one chiral alcohol.
- 10 8. A process for preparing a catalyst system by mixing the components A, B and C as
set forth in any of claims 1 to 7 in any order.
9. A catalyst system comprising the components A, B, C as defined in any of claims 1
to 8.
- 15 10. The use of a catalyst system as claimed in claim 9 in carbonylation reactions.